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ABSTRACT

Three separate papers from the Project are included in this document. One of these, by the Center staff, is entitled "Potentials of the Spaceship Earth Metaphor". It discusses static, dynamic, and analogic representations of spaceship earth and their educational value. A second paper, "Some Resources for Introducing Environmental Education Into the Schools", cites in narrative form several key sources. "Getting With Spaceship Earth", by Noel McInnis is the third paper. An essay, it discusses how desperately we are in need of perceiving the planet as a gestalt, and how our curriculum works against this by breaking the world up into analyzable parts. From among the three papers, one also gets a picture of the objectives and activities of the Center for Curriculum Design and its Spaceship Earth Curriculum Project. (JLB)

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GETTING WITH SPACESHIP EARTH

Noel McInnis

> We cannot effectively manage the environment without knowing what it is and how it behaves. We cannot detect changes, natural or man-made, desirable or undesirable, without repeated observations and established baselines. We neither know in a systematic way what the environment is like nor how and at what rate it is changing.[1]

Mankind is about to discover another planet. Until recently it was assumed that we had discovered all of the planets in our solar system, but it now turns out that this is not the case. In the process of scanning the skies for Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto, we overlooked the most important planet of all--Earth. Earth is the most important planet by any human definition, since this is the planet which sustains human life. And it is precisely because Earth is our home that we never discovered it before.

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Man-on-earth is in the same predicament as fish in the water. "If you want to know about water," Marshall McLuhan has quipped ad infinitum, "don't ask a fish." The environment into which we are born remains invisible to us unless one of two things happens: 1) we leave it, or 2) it changes drastically. Quite recently, both of these things have happened to man-on-earth. Man left the earth long enough to look it over, and brought back pictures which make it difficult for us to overlook the planet as formerly. And those of us who stayed on earth discovered our planet by virtue of the fact that its feedback is doing things to us which were entirely unintended in our doings to it. The coincidence of these events

is quite literally leading to our belated discovery of the third planet from our sun. What we are discovering, of course, is that the planet as a whole behaves differently than its parts. Our present habits of relating to the planet only in part are producing a planetary reaction which, on the whole, will be unfavorable to our continued enjoyment of the planet if not our very existence itself.

We are discovering, in other words, that our planet is a spaceship, a closed, finite system in which all behaviors ultimately feed back through the system upon themselves. Inappropriate behavior in one component of the system can disrupt or destroy the entire system. If the system is as complexly (and therefore as flexibly regenerative) as that of our planet, the destruction is more likely to be relative: the source of disruption will probably be eliminated by the system long before the system itself collapses. The system will become greatly altered in the process, but the whole will still survive the loss of some parts. Unlike the Apollo craft, as Bucky Fuller is fond of pointing out, the earth did not come equipped with an operating manual. Neither, therefore, does it require our services as crew. "Men go and come," we are told in Ecclesiastes, "but earth abides." It may also be written that man came and went.

On a spaceship, every sub-system is related to every other sub-system. Nothing in the design functions without reference to everything else. All sub-systems are affected by a major change in any one of them. In other words, the various sub-systems of a spaceship constitute one unified, balanced overall system. Any

imbalance orginating in one of the sub-systems is eventually redressed throughout the whole.

So well-integrated are our planet's numerous systems that the earth functions as a single organism. This fact we have demonstrated to ourselves most dramatically by the massive application of fertilizers and pesticides. The system-disruption potentials of this activity are most vividly illustrated by our long term experience with DDT. DDT symbolizes our dread of an unavoidable function of the planet, that of death. Although DDT's effects are mild in comparison with many other chemicals used in our death-control tactics, it has become the focus of all those who see the folly of avoiding our death by annihilating other forms of life.

DDT is being metabolized by the entire planet. It is found in the fatty tissue of penguins at the South Pole, thousands of miles from its nearest application. DDT is found in the fatty tissue of creatures of the air, creatures of the mountain, creatures of the plains, and creatures of the mid-ocean. DDT is carried by all of the planet's transmission systems--air, water, and food chains. As a result, the planet is soaking up DDT like a sponge. When DDT begins, as it has, to take its toll of the oceanic vegetation which produces 70% of the earth's atmospheric oxygen, it definitely tolls for thee. Since we are at the top of the food chain, we humans stand to concentrate more DDT in our systems than any other species. The concentration of DDT in our species is already so great that the milk of nursing mothers, in this country at least, exceeds by 2 to 6 times the amount of DDT considered adequate to make milk unfit for commercial sale

(i.e., human consumption) in interstate commerce.

On a spaceship, all inappropriate behaviors ultimately feed back through the system upon themselves. When we cast our dread upon the waters, we can be sure of its eventual return.

"What Does Our Planet Do?"

We must frankly admit that the discovery of our planet may not come in time to save us. The present crisis mentality concerning our environment could as likely increase the disruption of the planet's functioning as to decrease it. This is because many of the remedies being proposed--frequently called "eco-tactics"--are as partial and as out of context as the shortsided human activities which created the crisis to begin with. I am afraid that too many of us are approaching the environment crisis like James Thurber's "Scotty Who Knew Too Much."[2].

> Several summers ago there was a Scotty who went to the country for a visit. He decided that all farm dogs were cowards, because they were afraid of a certain animal that had a white stripe down its back. "You are a pussy-cat and I can lick you," the Scotty said to the farm dog who lived in the house where the Scotty was visiting. "I can lick the little animal with the white stripe, too. Show him to me." "Don't you want to ask any questions about him?" said the farm dog. "Naw," said the Scotty. "You ask the questions."
>
> So the farm dog took the Scotty into the woods and showed him the white-striped animal and the Scotty closed in on him, growling and slashing. It was all over in a moment and the Scotty lay on his back. When he came to, the farm dog said, "What happened?" "He threw vitriol," said the Scotty, "but he never laid a glove on me."
>
> A few days later the farm dog told the Scotty there was another animal all the farm dogs were afraid of. "Lead me to him," said the Scotty. "I can lick anything that doesn't wear horse-

shoes." "Don't you want to ask any questions about him?" said the farm dog. "Naw," said the Scotty. "Just show me where he hangs out." So the farm dog led him to a place in the woods and pointed out the little animal when he came along. "A clown," said the Scotty, "a pushover," and he closed in, leading with his left and exhibiting some mighty fancy footwork. In less than a second the Scotty was flat on his back, and when he woke up the farm dog was pulling quills out of him. "What happened?" said the dog. "He pulled a knife on me," said the Scotty, "but at least I have learned how you fight out here in the country, and now I am going to beat you up." So he closed in on the farm dog, holding his nose with one front paw to ward off the vitriol and covering his eyes with the other front paw to keep out the knives. The Scotty couldn't see his opponent and he couldn't smell his opponent and he was so badly beaten that he had to be taken back to the city and put in a nursing home.

Moral: It is better to ask some of the questions than to know all the answers.

Until we have a fairly good answer to at least one question, all of our answers are likely to aggravate the problem. We cannot intelligently cope with our spaceship until we know what it does. The question "What does our planet do?" is the priority question of our time. Until we know what our planet does, we cannot establist an intelligent ecological relationship with it.

Getting With It

Ecology is, after all, the study of the transactions among the organisms in a given environment. In any given instance, therefore, it is first of all the study of the relationship of an organism with, not to, its environment. The distinction between relating with and relating to is difficult for the Western mind to grasp, since almost all of our environmental perceptions--human relationships as well as physical--are based on the law of the lever. We

tend to perceive all of other-than-self as so much mass to be manipulated, as so many relationships to be had rather than transacted. As a result, our technologies are now succeeding in the manipulation of our total environment, with the further result that we are now being had by the planet.

The only way we can avoid being had by the planet is to get with it. But we cannot get with the planet until we know what it does. We are therefore desperately in need of intelligent eco-strategies, to assure that our eco-tactical doings to the environment are healing rather than aggravating the situation.

Eco-strategy involves the monitoring of natural processes and the development of technologies which are harmonious therewith. Eco-tactics consist of environmental manipulation. Perhaps the best way to illustrate this distinction is to take a brief look at the problem of birth control. The pill and the intrauterine device represent a tactical approach to the problem of birth control. Both the pill and the IUD represent the manipulation of a system to alter its functioning. The pill and the IUD are something we do to the reproductive system. The rhythm method, on the other hand, represents a strategic approach to birth control. That it has not been a highly reliable strategy is proven by the very existence of many who will read these words. But it could be reliable. The body chemistry of the female during the time she is capable of conception is different than when she is not. What if a woman were capable of accurately monitoring this particular nuance of her body chemistry, via a reasonably simple test analagous to the litmus test or the simple urinalysis with which diabetics can monitor their sugar level? If she had

this monitoring capability, it would not be necessary for her to tactically tamper with her physical processes or to tactically deny her emotional ones. She could very strategically get with her reproductive process and control birth in nature's own way.

We are every bit as much in need of getting with the planet as we are in need of getting with the human reproductive process. Population is a global problem, yet very few persons perceive it in global depth as well as in global breadth. The closed-system nature of our spaceship assures that any major change in the functioning of the human reproductive process, such as Zero Population Growth, will effect changes in many other systems. We cannot alter the pattern of human reproduction without alterations in the patterns of related systems. (A most obvious example: we cannot establish equilibrium in the population if we insist that Gross National Product must continually rise. Equilibrium in one major system requires equilibrium in all major systems. The assumption of additive growth, if ruled out for the population, must also be ruled out for the economic system. The economic implications of Zero Population Growth are in direct conflict with the economic assumptions which presently govern this country. Zero Population Growth is more subversive of the "American way of life" than Communism, because even Communism shares with capitalism the goal of additive growth.)

The fact that man is not presently with the planet is dramatically illustrated if we imagine that we could compress the world's present population of over three billion persons into one town of 1,000 persons, in exactly the same proportions.[3.] In such a town of 1,000 persons there would be only 70 (United

States) Americans. These 70 Americans, a mere 7% of the town's population, would receive half of the town's income. This would be the direct result of their monopolizing over half of the town's available material resources. Correspondingly, the 70 Americans would have fifteen times as many possessions per persons as the remainder of the townsmen.

The 7% American population would produce 16% of the town's food supply, eating nearly twice as much as necessary and storing for their future use, at tremendous cost, most of what they were unable to immediately consume. With most of the other 930 inhabitants of the town hungry, there would undoubtedly be ill feelings.

The 70 Americans would have an average life expectancy of 70 years, the other 930 less than 40 years. The lowest income group among the Americans, even though it included a few people who were hungry much of the time, would be better off by far than the average of the other townsmen. The 70 Americans and about 200 others representing Western Europe, and a few classes in South America, South Africa, Australia and Japan would be well off by comparison with the rest.

Could such a town, in which the 930 non-Americans were quite aware of both the fact and means of the Americans' advantages, survive? Could the 70 Americans continue to extract the majority of the raw materials essential to their standard of living from the property of the other 930 inhabitants? While doing so, could they convince the other 930 inhabitants to limit their population growth on the thesis that resources are limited? How many of the 70 Americans would have to become soldiers? How much of their

material and human resources would have to be devoted to military efforts in order to keep the rest of the town at its present disadvantage?

Chances are the 70 Americans would have to organize into a military camp in order to maintain their material dominance of the remainder of the town. Chances are most of the Americans would be too insecure or guilty about their situation to enjoy their dominance. Chances are this guilt and insecurity would lead some of the Americans to protest the situation and call for a change. Chances are that the protesting Americans would find themselves subjected to variations of the same repressive forces being used to subdue the other 930 townspeople. Chances are the military camp would also be a police camp.

The most regretful thing about the situation you have been asked to imagine is that it is not imaginary. For such is the present material relationship and incipient political relationship of the United States to the rest of the world. The material relationship is very clear: the United States is systematically plundering the planet's physical resources. And if the political conclusions drawn above are not yet so, they are rapidly becoming so. The logical complement of a nation of plunderers is a nation of police.

Environmental Monitoring

The only way to get with the planet is to find out what it does via a world-wide system of environmental monitoring. A recent report of the National Academy of Sciences makes it clear that this is a necessity not only for coping with global problems,

but for dealing with localized problems as well:

> The necessity for very broad monitoring is suggested by consideration of a relatively simple environmental relationship. Many people have settled in Southern California to enjoy the sun at the broad, clean beaches. Houses have been built right at the edge of the beach, which in some places have then become littered with kelp and buzzing with flies. The houses have displaced tiny animals such as isopods, which previously ate the kelp. More houses have been built inland and in some areas have been subject to floods. Dams have been built and have stopped not only flood water but also the sand that replaced the beach sand being constantly lost to deep water. Thus the beaches are becoming less wide and less widespread. Finally, to get to the beaches, more and more people drive more and more automobiles, and the resulting smog obscures the sun.
>
> This is a very simple outline of a most complex relationship. We cannot say what happened. We shall have no more success than we have had so far in dealing with these problems in the future without a comprehensive plan for monitoring the whole environment and its changes and knowing the possible consequences.[4]

The whole environment of any locality is, of course, nothing less than the entire planet. Nothing less than an understanding of the entire planet as an integrated system is becoming an absolute requirement for intelligent human interaction with local environments.

The problem of environmental monitoring at present is not that there is none, but that existing programs are partial and uncorrelated:

> We do make some baseline and serial observations at present through such environment-related agencies as the Environmental Science Services Administration, the U.S. Geological Survey, the Bureau of Commercial Fisheries, the Bureau of Sport Fisheries and Wildlife, the Forest Service, the National Air Pollution Control Administration, and the Federal Water Pollution Control Administration. In addition, many local and state agencies secure

> data on environmental parameters. Most of these data are obtained for special purposes, there is little cross-referencing of data, few comparative studies, and no overall evaluation of the quality of the environment. The existing environmental monitoring program has many critical gaps.[5].

Fortunately, we <u>can</u> get with the planet. We know enough about what the planet does that we are now able to develop the means for finding out everything else we need to know in answer to that question. The relevant information is being gathered by numerous national and international agencies, as well as by corporate and educational research departments. In addition to remaining uncorrelated, however, this information about what the planet does is also not being disseminated through the schools. As a result, the people who are least informed about our planet are those who are being prepared to live on it.

Thinking the World Together

The reason we learn very little about the planet in our schooling is because of the curriculum's overwhelming concern with the affairs of men. As far as the curriculum is concerned, man <u>is</u> the planet, and thus it is that we learn to consider only the human inhabitants of our spaceship as having first-order significance. When we do study the planet, it is still a very partial endeavor. We learn about the geographical part, or the biological part, or the physical part, but never are we enabled to develop a sense of the whole thing. Never, that is, are we presented with some perception of the planet as the total system that it is, so that we can perceive its parts in context. While the mind may be unable to concentrate on the planet as a total

system, it can certainly develop a planetary perspective or world-view which enables it to concentrate on particular sub-systems in contemplation of the whole.

Unfortunately, geography is largely the study of the names man has given to various locations on the earth and what he does with these locations. Biology is largely the study of terms man has given to the biota. Physics is largely the study of mathematical formulations man has given to discovered functions of the planet. And so on. Our formal studies of the planet, particularly at the level the vast majority of us encounter them in school, are focused upon the symbols we use to identify it rather than upon that to which the symbols refer.

Our present curriculum has enabled us to master our ability to think the world to pieces. Since we can relate to our environment only in the terms that we perceive it, we are now quite effectiv ly tearing the planet to pieces. If we are to think the world together, to comprehend (com=together; prehend=take) it as a single piece, we must create a new curriculum to complement the old.

The old curriculum has been very successful in conveying to us the fragmented, analytical, mechanical world view which enabled man to develop a technological civilization and which now shapes us to behave in mechanical conformity with our creations. But the planet and its occupants do not function according to the technological program with which we are attempting to subdue it, and thus our behavior is on a collision course with our own being. The planet's program is preponderantly that of synthesizing parts

into wholes. Man's program is preponderantly that of reducing wholes into parts. If the latter program is merely preliminary to a synthesis which accommodates itself with the planet, very good. But if man continues his program of reducing wholes into parts as presently practiced, his will be the ultimate parting from the planet.

We are desperately in need of perceiving the planet as a gestalt. The world ultimately hangs together in our perception of it, if we are to hang with it. There is no institution which does more to shape/misshape our perception of the world than the schools. A major burden for the creation of a planetary world view therefore rests upon the schools. At present, any student who emerges from high school or college with some sense of how the world hangs together does so in spite of his formal education. Present and subsequent generations must obtain such a perception as an integral part of their education. Somewhere they must learn to think the world together.

The need to think the world together is increasingly recognized by numerous individuals and organizations, and a few isolated and partial attempts are being made to develop educational materials and strategies to meet this need. Although none of these attempts is as fully developed as some of the isolated and partial environmental monitoring programs mentioned above, they would certainly derive a similar advantage from any concerted effort at correlation. At a minimum, they would benefit from the mutual awareness of one another's concerns, ideas, and objectives. This could be facilitated by an organization whose own objective on behalf of thinking the world together is to

create such a mutual awareness. Said organization could monitor the activities of others who are working at an integral understanding of the world, and facilitate communication among mutually supportive endeavors.

Fortunately, such an organization exists. The Center for Curriculum Design, a non-profit foundation in Evanston, Illinois, identifies itself as "An Educational Foundation for Thinking the World Together." Its major concern is with the development of materials and strategies for integrating knowledge. The Center seeks, creates, and disseminates information on persons, organizations, projects, materials, strategies, and ideas for integrating knowledge, developing whole-earth perspectives and other ecological mindsets, and increasing the public's environmental awareness.

Several of the Center's current activities are integrated in a comprehensive program called The Spaceship Earth Curriculum Project. These activities include the compilation of a directory to the type of information mentioned above; the development of a college-level Integrative Studies course at Evanston's Kendall College, entitled Environmental Thinking; the creation of original materials in all media which stress the theme of human/environmental integrity; and the eventual convening of a Spaceship Earth Curriculum Conference to bring together those who wish to develop whole-earth educational strategies and materials with those who are already doing it. Persons who identify with the task of thinking the world together are urged to correspond with the Center (823 Foster, Evanston, Illinois 60204).

Some time ago it was announced that the missing link between ape man and civilized man had been discovered. It turned out to be ourselves. This announcement was probably inaccurate in perspective. We have achieved the main fruits of civilization, and are discovering that many of them are too bitter to be tolerated. We have to get beyond civilization. The announcement should read that the missing link between ape man and earth man has just been discovered. It turns out to be ourselves.

So we'd better get with it.

1. Institutions for Effective Management of the Environment (National Academy of Sciences, Washington, D.C., January, 1970), p. 37.

2. Copr. © 1940 James Thurber. Copr. © 1968 Helen Thurber. From Fables for Our Time, published by Harper and Row. Originally printed in The New Yorker.

3. This analogy is quoted from Richard Heiss and Noel R. McInnis, Can Mare Care for the Earth?, to be published in Spring, 1971, by Abingdon Press (Nashville).

4. Institutions . . ., pp. 38-39.

5. Ibid., p. 37.

SOME RESOURCES FOR INTRODUCING ENVIRONMENTAL EDUCATION INTO THE SCHOOLS

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For

Technical Session II, "School Education," of the STRATEGIES FOR ENVIRONMENTAL CONTROL conference, Association of Junior Leagues of America, October 28, 1970, Marriott Motor Hotel, Chicago, Illinois

Reforming the Schools

Let's be realistic. Effective environmental education is about as welcome in the schools as a snowball . . .

You can't learn much about the environment unless you study it at first hand, a task which schools have been designed to prevent! Schools have been structured to remove young people from the environment, shutting their doors (and windows) against the distractions of the outside world so that the senses can be diverted to the blackboard and the printed page. The effect of this systematic exclusion of young people from the primary world of their senses--i.e., their environment--was poignantly described by one of my own students:

> Feel you a wasteness in your soul, an empty part you do not understand? Come back to long ago when a child you were all there still.
>
> Rock, slide, gurgling baby rolls his eyes to swing the room out the window letting sunshine warmth in. Smelling mother smiling near, he rolls over toys of sound then laughs.
>
> Later, he becomes aware of playing with himself. He watchs, listens, smells, tastes, touches. Mommy and Daddy loom into sense, and he knows what play interests them. As he grows, his awareness of pleasing his parents becomes him. He practices for them when the time is for play.
>
> Halfway between, the child goes away to school. Teacher dwells on sight of number, the sound of word, hearing to understand. One day he eats paste to find that tasting is for meals. The window is closed to fresh air. Smell is outside learning.
>
> The older, the farther play becomes. No longer does the child explore the world through his senses and imagination. The child drops the sound of real his words and haunts books of others' written words. No more does he listen to subtle whisperings outside but only the authoritarian which he repeats back. Adapting, he never realizes.
>
> The child has lost his senses. He isolates his mind from his body and relies on his "intelligence." The tragedy is that intelligence now means working with materials given from others and proceeding sequentially. With the senses out of use, the child loses the ability to discover. As he grows older, he feels he has lost something. He feels empty, but he can't see what it is. He's stopped really seeing.

Schools must be listed as one of the prime contributors to the lack of environmental awareness which has lead us to foul our nest on a global scale. There is a considerable body of literature on the ineffectiveness of schools in the face of the educational needs of our time, two volumes of which are particularly helpful: the just-published Carnegie Corporation study, Crisis in the Classroom, by Fortune editor Charles Silberman (Random House); and An Essay on Alternatives in Education (working title), by Everett Reimer, to be published some time in the coming year (presently available as document 1005 from The Center for Intercultural Documentation, Apdo. 479, Cuernevaca, Mexico).

Those who find themselves involved in changing the schools (an involvement which becomes inevitable if one is serious about introducing environmental studies), will find two other volumes of considerable help: How To Change the Schools, by Ellen Lurie (Random House), based upon the author's fifteen years of practical experience in effecting change within the New York public schools; and New Priorities in the Curriculum, by Louise M. Berman (Charles E. Merrill), which outlines the theoretical and strategic basis for a process-oriented curriculum.

Instructional Resources for Environmental Studies

Until the Educational Products Information Exchange Institute (386 Park Avenue South, New York, New York 10016) publishes next spring its guide to environmental curriculum materials, we lack a comprehensive directory to either the availability or quality of such resources. In the meantime, an annotated bibliography of printed and filmed materials (entitled "An Ecology Guide") is available in the May, 1970 issue of Media and Methods (published at 134 North 13th Street, Philadelphia, Pa. 19107).

Those who are seeking a comprehensive guide to teaching environmental concepts may consult The Environmental School, by Mario M. Menesini (Educational Consulting Service, 372 Village Square, Orinda, California 94563). This book, which emerged from a curriculum development project for the National Park Service, is a step-by-step guide to the establishment of an environmental education or environmental awareness program. A series of concepts, questions, and lesson suggestions provide basic ideas for teaching environmental concerns within traditional school disciplines. One section of the book deals with a cooperative site survey which will help teachers and site staff understand the educational possibilities of an area. Specific sites are used to give examples of approaches to different ecological areas. The guide also covers on-site orientation, suggestions for field trips, and do-it-yourself ideas for those with limited facilities.

Teachers interested in creating environmental lessons of their own can use the guide to prepare individualized materials for their classes. The information has been cast so that the concepts relate to all environments and questions stimulate cognitive, affective, and skill development responses--totally new approaches to today's environmental concerns. Five major sections of the book are in subject matter area divisions: art, communications, math, science, social studies. After a brief introductory page relating these disciplines to environmental concerns, each subject is used with each of five conceptual Environmental Strands suggesting lessons related to appreciation, utilization, and ethics.

Institutions for Effective Management of the Environment, a report of the National Academy of Sciences (2101 Constitution Avenue, Washington, D.C. 20418), cites the Science Curriculum Improvement Study (SCIS) as the "most promising for environmental education" of several elementary level (K-6) national curriculum development projects in science. The report cites SCIS "because it centers attention on ecological and biological questions." The report continues:

> [SCIS] is unique in that it provides a variety of living organisms for classroom demonstrations and experiments as part of a complete elementary science course. The educational materials consist of textbooks, teachers' manuals, films, demonstrations, and experimental kits. At present the course is being taught to 200,000 children, and that figure is expected to rise to between 2 and 5 million within a few years. The project staff consists of approximately 30 persons, led by two scientists of national reputation and a young school administrator with a strong background in science. It is funded by the National Science Foundation in the amount of approximately $600,000 per year; the total spent so far is approximately $4 million. The project is housed at the Lawrence Hall of Science, a Science Museum Teacher Training Center at the University of California in Berkeley. The project has been received favorably in U.S. schools and has been adopted by the Swedish government for use in Swedish public schools.

The November, 1969, issue of Environment (Committee for Environmental Information, 438 North Skinker Blvd., St. Louis, Missouri 63130) contains an article by Alan McGowan entitled "Getting Their Feet Wet." This article (reprinted below) is indicative of environmental education's counter-thrust to the concept of the enclosed classroom. Since its publication, 20 additional schools have been involved in the 1970 summer workshop. All 40 schools are currently cooperating in the creation of a guide to activity methods for jointly involving teachers and students in environmental study. The purpose of this guide, to be published in late spring or early summer of 1971, is to provide an initiating experience which will enable its users to begin developing original activity projects

appropriate to their own local circumstances. (An additional series of five workshops, involving approximately 100 high schools, is being planned for the summer of 1971. The November, 1970 issue of Environment contains an evaluative article written by five participating students. Additional articles on the project are scheduled for publication in The Physics Teacher and The Ecologist, a British publication.)

The January, 1970, issue of Education Recaps contains the following entry under "Environmental Studies:"

> Western Washington State College and the California State College at Fullerton are working out programs designed primarily to present comprehensive information about the environment to teachers and to school children.
>
> Western Washington's Northwest Outdoor Education Center will offer to primary and secondary schools an interdisciplinary approach to the sciences, arts, and humanities within a natural environment. Western Washington will also open a second cluster college, Huxley, devoted entirely to environmental sciences.
>
> California State College has started an institute designed to share with secondary-school teachers new scientific information about human ecology and to develop new methods of teaching the subject.

For information on environmental studies in higher education, the following publications are invaluable: Environmental Education, a periodical edited by Clay Schoenfeld, University of Wisconsin, Madison, Wisconsin; Environmental Studies, 1970, a guide to programs at various colleges and universities edited by Everett Hafner for the Scientist's Institute for Public Information, 30 East 68th Street, New York, New York 10021; and Popins, a newsletter on environmental studies programs published by The Population Institute, 100 Maryland Avenue, N.E., Washington, D.C. 20002.

Funding

President Nixon is expected to sign a bill authorizing expenditure of federal funds for environmental education. Information on such funding will be available from the newly established Office of Environmental Education, in the Department of Health, Education, and Welfare. Other sources of funding will depend upon the initiative of state and local governing bodies, as well as upon the initiative of concerned school boards and parents who wish to develop local programs in cooperation with local business and financial firms.

Feedback

The Center for Curriculum Design (823 Foster Street, Evanston, Illinois, 60204) desires to be made aware of any significant programs for the introduction of environmental studies at any level of the educational system (K-20). In return, the Center will provide informational assistance wherever possible.

The Center is a non-profit educational foundation devoted to the improvement of educational environments, curricula, and instruction. Its major concern is with the development of materials and practices for thinking the world together, to complement the prevailing educational practices which fragment and compartmentalize knowledge and experience. The Center seeks, creates, and disseminates information on persons, organizations, projects, materials, strategies, and ideas for integrating knowledge, developing whole-earth perspectives and other ecological mindsets, and increasing the public's environmental awareness.

Several of the Center's current activities are integrated in a comprehensive program called The Spaceship Earth Curriculum Project. These activities include the compilation of a directory to the type of information mentioned above; the development of a college-level Integrative Studies course at Kendall College, entitled Environmental Thinking; the creation of original materials in all media which stress the theme of human/environmental integrity; and the eventual convening of a Spaceship Earth Curriculum Conference to bring together those who wish to develop whole-earth educational strategies and materials with those who are already doing it.

Noel F. McInnis
Director

POTENTIALS OF THE SPACESHIP EARTH METAPHOR

by

The Staff
of
The Center for Curriculum Design

SPACESHIP EARTH CURRICULUM PROJECT
The Center for Curriculum Design
823 Foster Street
Evanston, Illinois 60204

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The SPACESHIP EARTH CURRICULUM PROJECT was conceived in the Spring of 1970. Its objectives include:

1. Development of the conceptual potentials of the Spaceship Earth metaphor;

2. Creation of a one-year college-level Integrative Studies course (currently taught at Kendall College, Evanston, under the title "Environmental Thinking");

3. Creation of original materials in all media which stress the theme of human/environmental integrity;

4. Convening of a Spaceship Earth Education Conference to bring together those who wish to develop whole-earth educational materials and strategies with those who are already doing it.

The Center desires to be informed of any related materials, methods, and endeavors.

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POTENTIALS OF THE SPACESHIP EARTH METAPHOR

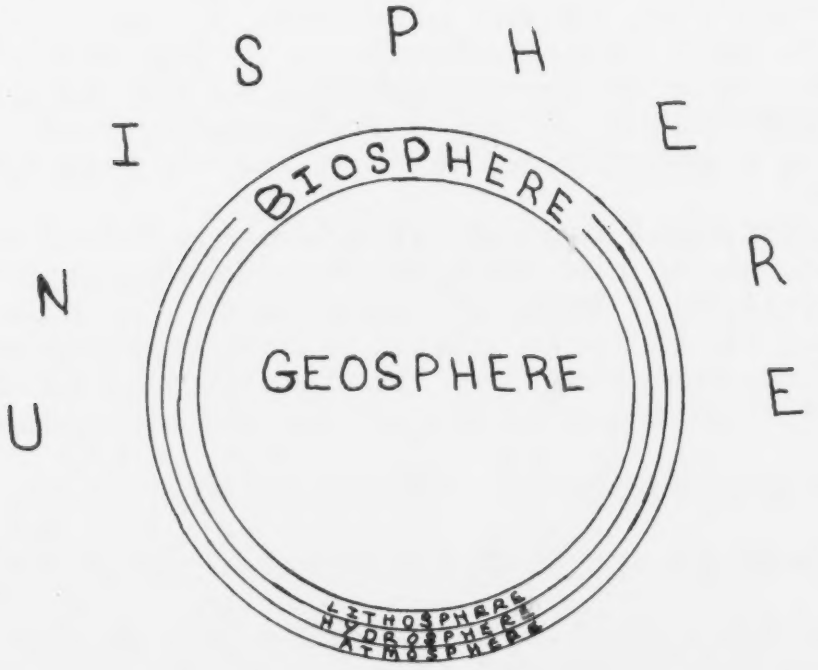
Preliminary grammatical footnotes:

1. Garrett Hardin has pleaded for a designation of the species "man" which includes woman also, and hence the use of the term "humankind" throughout the following. Hence also the use of third person plural pronouns in reference to humankind, which, while perhaps not good grammar would seem to be in good taste. The pronoun "it" would put us all down.

2. The term "unisphere" is used not only for consistency, but also because it is not unreasonable to assume that the universe is spheroid.

A Static Representation of Spaceship Earth

If we draw a cross-section of the earth, we get a series of concentric circles:



Such a diagram sufficed to represent the earth until recently. But because humankind's ecological niche is now biospherical in scope, their presence on the earth also requires representation. Humankind can be represented by two "spheres" which overlap the above diagram, the anthroposphere (humankind's doing) and the ideosphere (humankind's thinking).

The mind/body distinction explicit in the separation of anthroposphere and ideosphere does not signify dualism, but rather complementarity. Just as the entire range of phenomena of light can be adequately explained only by referring to light sometimes as a wave and at other times as a particle, so the entire range of human phenomonena can be adequately explained only by referring to humankind sometimes as doing and at other times as thinking. If one actually does overlap the anthroposphere and ideosphere on the above diagram, the existence of this complementarity becomes manifest. With the exception of our limited forays into space and the Mohole project, the anthroposphere is coterminous with the biosphere. The ideosphere, on the other hand, is coterminous with the entire diagram, else it could not be drawn.

This highly simplified representation of the planet is extremely helpful. It immediately enables us to define the environmental problem in its totality: humankind has established an essentially invisible biospherical niche, but almost everywhere behaves within the visible constraints of a more localized niche. As a result, the anthroposphere and ideosphere are out of phase with the rest of the biosphere. Our planet is therefore laboring under an acute functional disharmony between its non-human and human spheres of operation.

The complementarity which characterizes the human sphere of operation also characterizes the solution to the environmental problem as just defined: humankind's doing must catch up with humankind's thinking. Our knowledge of the biosphere and unisphere is such that we currently know much better than we do. The disharmony between humankind and the rest of the biosphere is thus largely the manifestation of an incongruence in man's complementary nature. Getting the planet together amounts to no more and no less than getting humankind together.

The cross-sectional diagram of Spaceship Earth provides a conceptual framework which has both present (descriptive) and future (prescriptive) utility. When we conceive of the planet as a spaceship and consider it in terms of its major interacting components, we see that understanding the human/environmental interface can be developed from the pursuit of two broad questions:

What is the planet doing? (descriptive)

How can humankind get with the rest of the planet? (prescriptive)

It is presently possible to describe the doings of both the biosphere in general and humankind in particular. Fortunately, we can also prescribe for the former. We know enough about the biosphere not only to describe what it does but also to specify how it does. That is, we can specify some of the fundamental operating principles of the biosphere (food-chaining, recycling, etc.). Knowing the fundamental operating principles of the biosphere enables us to prescribe for the biosphere, to discriminate between those activities of humankind which are compatible with its operating principles and those which are n[illegible]d while it will be some time before we can specify operating [illegible]iples for humankind as confidently as we can for the biosphere, w[illegible] need only our present descriptive capabilities to identify humankind's disoperative activities.

Disoperative activities of humankind are most apparent in the context of a Spaceship Earth perspective.

The biosphere/anthroposphere/ideosphere concept will gain utility as we come to know more about human behavior. Whereas sciences such as ethology, bio-neuro-physiology, design science, proxemics, kinesics, bio-cybernetics, bionics, ekistics, etc. have yet to empower us with more than tentatively generalized "operating principles" of the anthroposphere and ideosphere, firmer generalizations will become possible in this century. We are already coming to know enough about the actual operation of human genetics to become prescriptive concerning humankind. This will allow us to become proportionately more precise in our ability to specify criteria of habitability, that is, to define the environmental requirements essential to the preservation and effective development of genetically governed human capacities.

The implications of humankind's operational principles will also become most apparent in the context of a Spaceship Earth perspective.

A Dynamic Representation of Spaceship Earth

The first holocoenetic diagram below represents an action model of the biosphere-in-unisphere. It is, in effect, an energy-flow chart for Spaceship Earth. It speaks for itself, to anybody who wishes to take the time. (NOTE: the reader is encouraged to utilize the second holocoenetic diagram to help in thinking through other sets of complex interrelationships, such as humankind in the city, the student/teacher/administrator in the university, or the sincere individual in politics. The diagram is useful for getting any spaceship together--or for seeing why it is not together.)

An Analogic Representation of Spaceship Earth

William G. Pollard wrote in the September, 1969 issue of The Science Teacher:

> It is instructive to pursue the analogy of the earth as a large spaceship. An interesting exercise is to write down the design criteria for a spaceship to carry a crew of 250 on a 40-year journey through space. Such criteria would include adequate radiation shielding; energy or fuel reserves required for instrument operation, navigation, and heating; assured supplies of air, water, and food for the crew throughout the journey; waste reprocessing and disposal; and many others. With such a list in hand, it is instructive to review the extent to which the earth, considered as a spaceship, fulfills each of the design criteria. One discovers in carrying out this exercise that the earth is amazingly well designed as a spaceship for carrying a crew of some two to three billion human beings, but not many more, on a long journey through space.
>
> It would not be possible to design a more effective and efficient radiation shield for a spaceship than the earth's atmosphere. Although transparent to light it cuts out completely all the far ultraviolet, X rays, and

higher-energy radiations of outer space. The aurora borealis magnificently displays this shield in operation as it keeps all the high-energy electrons and protons which bombard the earth above 60 miles from its surface. Under this efficient shield the only radiation hazard to which we are exposed is sunburn from the near ultraviolet which does get through.

Let us now consider in greater detail some of the other fundamental requirements for a satisfactory spaceship. First, it must have an adequate source of energy to last throughout the trip. Next, it must have an adequate food supply or means of producing food for the crew. The air and water reserves in the ship must be kept pure and adequate for all needs. Wastes must be reprocessed or disposed of in ways which will not contaminate the ship. Finally, the crew must not be allowed to increase in numbers, and it must remain unified throughout the journey. Divisions into warring rival subcrews or interpersonal conflicts between crew members would be catastrophic in a spaceship on an extended voyage.

A detailed, comprehensive statement of the analogies between our planet and a spaceship would be one of the most effective ways of exposing as such the disoperative activities of humankind.

Richard L. Meier, professor of design at Berkeley, commented at the December, 1970 AAAS meeting in Chicago on the difficulty of familiarizing students trained in computerized systems with the requirements of living systems. He has found that one of the most effective approaches to such familiarization is to tap the students' imaginative capacities by assigning them to design an adequate environment for creatures which don't actually exist but about which we "know" quite a bit, such as unicorns. Designing a spaceship to carry a crew with a specified maximum population on a journey lasting several generations would have similar imaginal potential, with perhaps more "real" world application. While designing such a spaceship the participating individuals would, in fact, find themselves creating their real world.

A Case-Study Approach to Spaceship Earth

It would also be instructive to comprehend Spaceship Earth from the perspective of a "briefing" for extra-terrestrial visitors (assuming no language barriers). The "briefing" format essentially forces one to adopt the say-more-with-less feature which characterizes the metaphor at the outset, including the development of graphic, filmic, and kinetic representations.

Game Approaches to Spaceship Earth

The World Game, inspired and partially funded and nurtured by R. Buckminster Fuller, is the most intensive and extensive current application of the Spaceship Earth metaphor. This Game is designed to facilitate the discovery of exponentially more efficient ways of allocating, transforming, and utilizing the world's resources so as

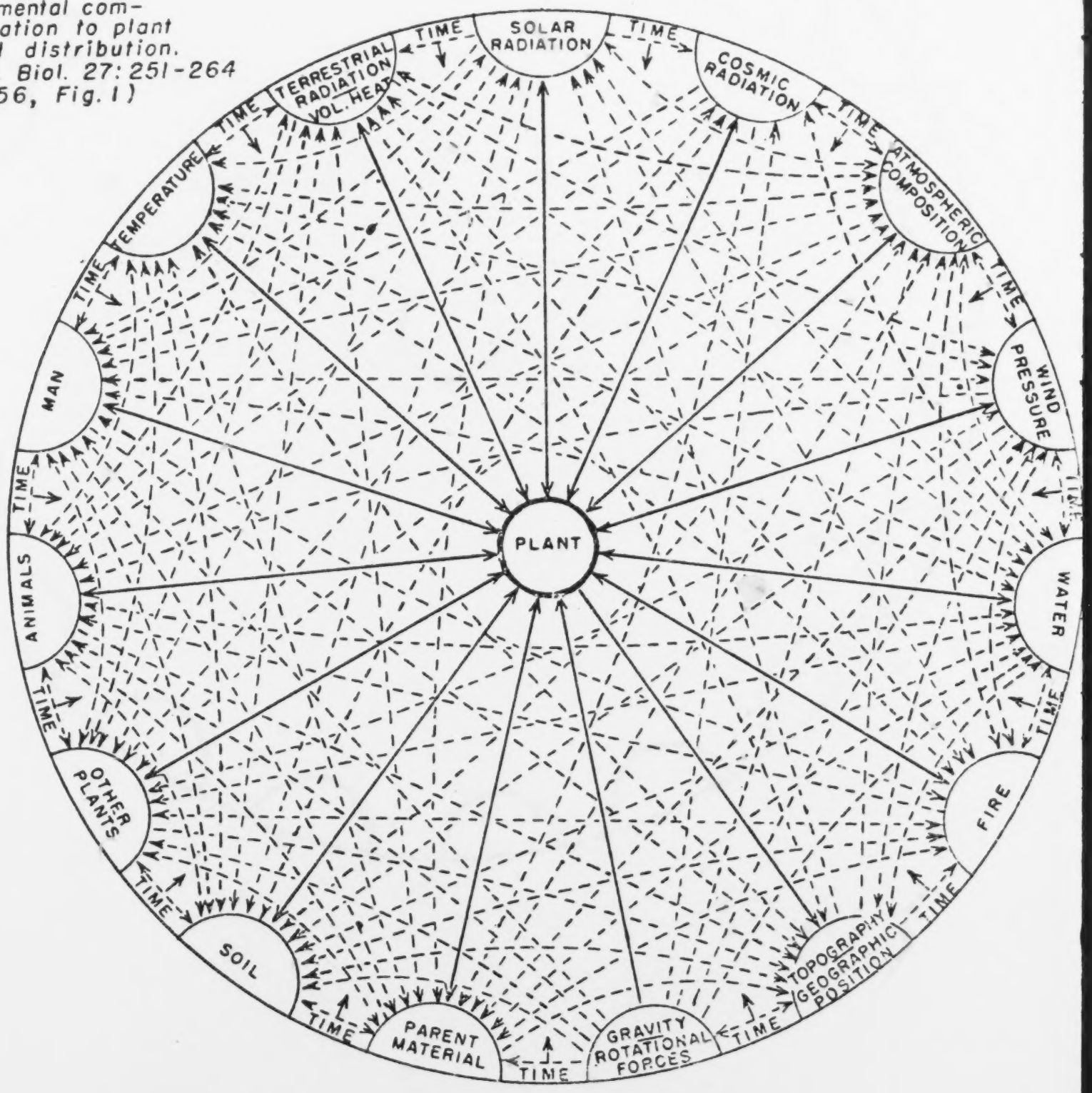
to never decrease anybody's existing individual advantage while at the same time making humankind 100 per cent physically successful in terms of adequate living standards.

The World Game is at least a course, and potentially an entire curriculum, for comprehending Spaceship Earth. Although presently in full-scale development only at Southern Illinois University in Carbondale, Illinois, and at the University of Detroit, it could become part of any school's offering (late elementary to post-graduate).

A more simplified approach to comprehending the planet as a Spaceship is certainly possible via one or more entertainment-type games (cf. Monopoly, Scrabble, etc.). A number of such games, ranging from simple to sophisticated, needs to be developed.

A HOLOCOENOTIC ENVIRONMENTAL COMPLEX

Billings, W.D. 1952
The environmental complex in relation to plant growth and distribution.
Quart. Rev. Biol. 27: 251-264
(See p. 256, Fig. 1)



Solid lines show factor-plant relationships. Dashed lines show relations between factors. Arrows show the general direction of the effect. If the effect is reciprocal, arrows are placed at both ends of the line.